United States Department of the Interior
Bureau of Land Management

Environmental Assessment CO-110-2006-117-EA
Casefile Number: COC-69167, COC-69166, COC-69194

Finding of No Significant Impact

Shell Frontier Oil and Gas Inc.
Oil Shale Research, Development, and Demonstration Pilot
Location: Meeker, Colorado

Applicant/Address:
Shell Frontier Oil and Gas Inc.
4582 S. Ulster Parkway
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U.S. Department of the Interior
Bureau of Land Management
White River Field Office
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Finding of No Significant Impact

White River Field Office

INTRODUCTION:

The Bureau of Land Management (BLM) has conducted an environmental analysis (EA No. CO-110-2006-117) for a proposed action to address oil shale research, development, and demonstration (RD&D) projects in Rio Blanco County, Colorado in accordance with BLM's Oil Shale RD&D Program announced in the Federal Register (FR, June 9, 2005, Vol. 70, No. 110).

Shell Frontier Oil and Gas Inc. (Shell) would conduct RD&D projects on three separate sites of 160 acres each on land managed by BLM to demonstrate three different technologies to develop oil shale. The sites will be used to test different methods of shale oil extraction that may prove more or less economically or environmentally feasible. All three RD&D projects at the sites would utilize Shell's proprietary In-situ Conversion Process (ICP) to recover oil or kerogen.

These sites lie within the Piceance Basin, which is bounded on the north by the White River, on the east by the Grand Hogback, on the south by the headwaters of the Roan and Parachute creeks in the Roan Plateau, and on the west by the Cathedral Bluffs. The Piceance Basin of northwestern Colorado contains significant oil shale resources. The Department of Interior identified that more intensive research and consequent development of technology is needed to test the availability and practicality of extracting energy fuels from the oil shale resources on public lands. The purpose of the action is to lease parcels of public land for RD&D projects that will inform and advance knowledge of commercially viable production, development, and recovery technologies consistent with sound environmental management.

Shell has proposed research projects to evaluate the feasibility and commercial viability of developing oil shale resources in-situ. The purpose of this proposal is to achieve a "proof of concept." That is, while laboratory experiments and theoretical calculations indicate that various in-situ methodologies are viable commercial options, none have been thoroughly field tested to evaluate the practical application. This proposed project provides the opportunity to practically apply those specific technologies under field conditions. The project results will advance knowledge of these methodologies regardless of whether or not they prove commercially viable.

Variations of the ICP process will be used at three sites as follows:

- **Site 1- Oil Shale Test Site**

  Basic ICP – implemented by recovering hydrocarbons from kerogen using self-contained heaters that heat the rock. A freeze wall would be installed to prevent groundwater from flowing into areas where ICP is being used.

- **Site 2 – Nahcolite Test Site**

  Two-Step ICP – implemented by initially extracting nahcolite by injecting hot water into the shale and then recovering hydrocarbons through ICP once the nahcolite is removed. This process also involves the installation of a freeze wall.

- **Site 3- Advanced Heater Test Site**

  Electric-ICP (E-ICP) – implemented by recovering hydrocarbons from kerogen using bare wire heaters to heat the rock; some of the heat is created by the flow of electricity through the shale formation. This bare electrode process is a patented in-situ heating technology. A freeze wall will be used in this process as well.

BLM has concluded that initiating steps to facilitate oil shale research and development efforts is worthwhile, and believes that this effort will significantly enhance the collective knowledge regarding the viability of innovative technologies for oil shale development on a commercial scale. The exploration and future development of the oil shale resources will help supply our future domestic energy needs and play an integral part in our nation's energy security. Additionally, Shell is developing technology which will allow extraction of both sodium minerals and oil shale in areas where valuable deposits of these resources are intermingled.

The underlying need for the proposal would be met while accomplishing the objectives of significantly advancing knowledge regarding the commercial viability of in-situ technologies for hydrocarbon recovery from oil shale.

The EA, if not attached, is available at the White River Field Office and incorporated by reference in this Finding of No Significant Impact (FONSI) determination. A Proposed Action, a Subalternative (Proposed Action with Mitigation), and a no action alternative were analyzed in the EA.

PLAN CONFORMANCE AND CONSISTENCY:

The proposed action and alternatives have been reviewed and found to be in conformance with one or more of the following BLM Land Use Plans and the associated decision(s):

The proposed RD&D projects are subject to and have been reviewed for conformance with the following plan (43 1610.5, BLM 1617.3):

Name of Plan: White River Record of Decision and Approved Resource Management Plan (ROD/RMP)

Date Approved: July 1, 1997

Decision Number/Page: 2-6

Decision Language: "…At the discretion of the Secretary of the Interior, research scale lease tracts will be considered within lands available for oil shale leasing. Approval of research tracts will be based on the merits of the technology proposed."

Name of Plan: White River Record of Decision and Approved Resource Management Plan (ROD/RMP)

Date Approved: July 1, 1997

Decision Number/Page: 2-7

Decision Language: "…Facilitate the orderly and environmentally sound development of sodium resources on public lands…the multimineral zone will be reserved for multimineral leasing."

It has been found to be in conformance with the RMP and with the intent of the Energy Policy Act of 2005.

FINDING OF NO SIGNIFICANT IMPACT DETERMINATION:

Based upon a review of the EA and the supporting documents, I have determined that the project will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27 and do not exceed those effects described in the White River RMP/Final Environmental Impact Statement (FEIS). Therefore, an environmental impact statement is not needed. This finding is based on the context and intensity of the project as described:

Context: The study area for cumulative impacts is the White River Resource Area (WRRA). The WRRA is managed by the WRFO. Of the 2.6 million acres of land within the WRRA, the surface of 1,455,900 million acres is managed by the BLM (BLM 1997). The primary human influences on the project area are oil and gas development, historic oil shale and nahcolite mining, and livestock grazing. Existing environmental conditions in the project area reflect changes based on past projects and activities. The project area is rural and relatively undeveloped but is experiencing growth related to energy development.

The Shell RD&D projects are site-specific actions directly involving three 160-acre parcels of land administered by the BLM. While the technology advanced by the Shell could have national, regional, and state-wide importance for its contribution to unlocking significant oil resources that could help to supply the Nation's future domestic energy needs, the three Shell test sites, in and of themselves, will not produce oil in quantities that would contribute to domestic supplies.

Estimates of the total past, present, and foreseeable future surface disturbance from oil and gas development and oil shale and nahcolite mining equate to 2.4 percent of the total area of the WRRA managed by the BLM. Five Oil Shale RD&D proposed actions are located in the northern portion of the Piceance Basin, primarily on undeveloped land, all within the WRRA. The 800 acres associated with these five proposed actions equate to 2.3 percent of all past, present, and future proposed actions, and 0.06 percent of the WRRA managed by BLM.

Intensity: The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27 and incorporated into BLM's Critical Elements of the

Human Environment list (H-1790-1), and supplemental Instruction Memorandum, Acts, regulations and Executive Orders. The following have been considered in evaluating intensity for this proposal:

1. Impacts that may be both beneficial and adverse:

The beneficial effects of the RD&D project include the advancement of innovative technologies to explore and develop the abundant oil shale resources within the Piceance Creek Basin to meet the needs of our nation's future energy requirements. Opting for a small-scale, staged approach to oil shale development provides an opportunity to prove the concept of the technologies involved and to field test operations at economic and environmentally acceptable levels. The Shell RD&D projects could add to the collective knowledge regarding the viability of an untested technology for use in oil shale development on a commercial scale.

The in-situ technology proposed on all three test sites would not permanently modify the land surface, and if the RD&D efforts prove not to be technically, environmentally, or economically feasible, the projects would be dismantled and lands could be reclaimed with minimal adverse environmental impact.

Adverse effects include the potential for impacts to water resources, soils, vegetation, wildlife, recreation, and visual resources that would occur during construction and operation of the Proposed Action with Mitigation.

2. Degree of effect on public health and safety:

The BLM has selected the Proposed Action with Mitigation, comprised of the construction, operation, and maintenance of oil shale RD&D facilities together with supporting access and utility rights-of-way and lease issuance, incorporating mitigations, as the environmentally preferred alternative. The Proposed Action with Mitigation achieves the balance of resource protection and beneficial uses of the human environment envisioned by the National Environmental Policy Act (NEPA).

In contrast to previous oil shale development ventures, the small-scale RD&D projects would have minimal impacts on the socio-economic infrastructure of local communities. Environmental commitments, and mitigation measures described in Terms/Conditions/Stipulations as part of this decision, would minimize any public safety effects during project construction and operation.

The alternative mitigation measures enumerated in the EA provide sufficient control to reduce or minimize impacts to an insignificant level.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas:

There are no prime farmlands, parklands, floodplains, wild and scenic rivers, wilderness areas, National Landscape Conservation Areas, National Monuments, National Parks, or Areas of Critical Environmental Concern (ACECs) in the project area. As described in the EA, impacts to wetlands and riparian areas are not anticipated. The Proposed Action with Mitigation requires monitoring of wetlands and water quality to determine if hydrologic interactions lead to potentially adverse impacts.

Cultural resource surveys were conducted in the last few years on each of the three sites. Site 3 contains a prehistoric camp site; Shell will avoid and fence off this part of Site 3 until more testing of the cultural site is done. The Proposed Action with Mitigation contains requirements and contingencies in the event that previously unknown cultural resources are identified. Monitoring and environmental commitments included in the Proposed Action with Mitigation will be developed prior to, and implemented during project construction to minimize the potential for adverse impacts to scientifically significant cultural or paleontological resources and will lessen adverse effects to public lands administered by the WRFO.

4. Degree to which the possible effects on the quality of the human environment are likely to be highly controversial:

Public input regarding the proposed RD&D projects has been solicited throughout the RD&D planning process. Representatives of the BLM, Rio Blanco County government, and the U.S. Fish and Wildlife Service (USFWS), met or consulted informally at various times to discuss the potential impacts of oil shale development on the resources under their respective administration.

Public involvement included public scoping meetings held in local communities throughout the region, as well as in open house forums that provided opportunities for the public to view the technologies proposed and to interact with industry representatives. These open houses were held to inform the public of the interdisciplinary team approach to working with the third-party contractors preparing the EAs for the RD&D proposals so as to provide consistency among the EAs and to allow shared impact analysis for regional resources. The open houses also provided additional public comment and Q&A opportunities. During the public comment periods, fifteen written comments were received: eight from members of the general public, two from educational institutions, two from environmental advocacy groups (one of which was a collaboration of comments from ten individual organizations), and the remainder were received from state and federal governmental entities. Many of the comments generally recognized that the Proposed Action with Mitigation offered an opportunity to better understand the oil shale resource without sacrificing important natural resources. Concerns were raised about impacts to surface and ground water resources, air quality, and wildlife resources. These impacts have been reduced to insignificance through the implementation of mitigation measures. Other comments were focused on multiple use management, suitable protective measures, and around concerns that the BLM environmental review be commensurate with the scope of the potential for commercial scale operations and incorporate statements on broad actions concerning the provision for conversion to commercial leasing and subsequent environmental and socio-economic impacts.

Based on the number and content of the comments received from the public, the effects of the RD&D projects on the quality of the human environment are not considered highly controversial. However, the past oil shale boom and bust cycles, most recently the bust of May 2, 1983 which resulted in significant adverse impact to the social and economic stability of western Colorado, increase the likelihood that a high level of public interest in the implementation, monitoring, and demonstration of feasibility associated with the RD&D leases can be expected.

5. Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risk:

The Shell projects will use in-situ heating of the shale to convert kerogen to oil and gas. Anticipated effects on the quality of the human environment as a result of the proposed technology have been thoroughly identified, analyzed, and mitigated to an insignificant level.

Due to the nature of the RD&D projects, some degree of uncertainty is to be expected. The small-scale approach of initiating research on 160-acre parcels reduces risk by providing an opportunity to field test operations at environmentally acceptable levels. Shell has developed various response, compliance, and mitigation plans as part of their approved plan of operations. When uncertainty about impacts to the human environment was identified in the analysis of the proposed action, comprehensive mitigation measures were identified and analyzed in the Proposed Action with Mitigation. In addition to project design criteria, BLM-required mitigation, and required monitoring and response plans, the permitting that accompanies lease approval also includes requirements from regulatory agencies that further mitigate uncertain aspects of implementing the project. The result is a series of built-in checks to address uncertainties associated with implementing the untested technology and incorporates adaptive measures to implement in the event unknown risks are identified.

6. Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration:

The Proposed Action with Mitigation is a site-specific action directly involving three 160-acre parcels of land administered by the BLM. Shell has applied for a lease to be issued for a term of 10 years with the option for an extension not to exceed 5 years upon demonstration to the satisfaction of the Authorized Officer that a process leading to production in commercial quantities is being diligently pursued. The lease is subject to conversion to a 20-year lease upon documenting to the satisfaction of the Authorized Officer that it has produced commercial quantities of shale oil from the lease. The Lessee has the exclusive right to convert the research and development lease acreage to a commercial lease and acquire any or all portions of the remaining preference lease area up to a total of 5,120 contiguous acres. Additional NEPA analysis would be required prior to the decision to convert the RD&D lease to include the preference right acreage.

If implementation of the proposed action with mitigation results in proving Shell's proposed technologies for in-situ hydrocarbon extraction from oil shale, this could affect

future BLM actions with regard to future leasing of public oil shale lands, based on the outcome of the programmatic environmental impact statement (PEIS). The demonstration of the feasibility of Shell's proposed technologies could result in increased interest in using BLM administered lands for energy production. However, this action does not represent a decision in principle about a future consideration.

The Energy Policy Act of 2005, Public Law 109-58 (H.R. 6), also directs the Secretary of the Interior (the Secretary) to complete a PEIS for a commercial leasing program for oil shale and tar sands resources on public lands with an emphasis on the most geologically prospective lands within each of the states of Colorado, Utah, and Wyoming. BLM will base future decisions with respect to land use planning in three states and regulations for commercial oil shale leasing on that analysis. Those decisions will be made independently of this action, except insofar as results of Shell's projects may add to our information about in-situ technology.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts:

The study area for cumulative impacts is the WRRA. The WRRA is managed by the WRFO. Of the 2.6 million acres of land within the WRRA, the surface of 1,455,900 million acres is managed by the BLM. Estimates of the total past, present, and foreseeable future surface disturbance from oil and gas development and oil shale and nahcolite mining are estimated to equate to 2.4 percent of the WRRA.

A total of five Oil Shale RD&D proposed actions are located in the northern portion of the Piceance Basin, primarily on undeveloped land and all within the WRRA boundary. The percentage of the five proposed tracts currently developed with pipelines, wells, research tracts, or roads was estimated by each of the consultants preparing the EA using aerial photography and site visits. The 800 acres associated with these five proposed actions equate to 2.3 percent of all past, present, and future proposed actions, and 0.06 percent of the WRRA managed by BLM.

The Proposed Action with Mitigation would not individually have a significant impact on any natural resource within the Piceance Creek Basin or within the communities of the region. However, cumulative impacts to natural resources could occur as the Proposed Action with Mitigation operates in conjunction with other past, present, or reasonably foreseeable future actions, such as the expanding oil and gas production operations in northwestern Colorado. These impacts would be long-term, but not permanent, would occur over a relatively small percentage of land when compared to the overall size of the WRRA and would not result in significant impact to any areas of historic, cultural, or biological importance.

8. Degree to which the action may adversely affect district, sites, highways, structures, or objects listed on the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources:

No districts, sites, or other properties eligible for listing to, or included on, the National Register of Historic Places were identified for the Proposed Action with Mitigation.

Cultural investigations have satisfied the Secretary of the Interior's Standards and Guidelines for the identification of historic properties. No eligible historic properties were identified within the area of potential direct or indirect effects. On-site monitoring of excavation activities by qualified archeologists provided by the BLM will minimize the potential for adverse effects to heritage resources. The Proposed Action with Mitigation contains requirements and contingencies in the event that previously unknown cultural resources are identified.

9. Degree to which the action may adversely affect an endangered or threatened species or its critical habitat:

Field surveys were conducted on the three 160-acre parcels and surrounding areas by qualified biologists in spring 2006 and found that no critical habitat for threatened and endangered animal or plant species are present at any of the three locations.

A Biological Assessment (BA) was prepared in compliance with Section 7(c) of the Endangered Species Act (ESA) and submitted to USFWS. The USFWS will review the BA to assess the potential impacts of the Proposed Action with Mitigation on federally-listed endangered, threatened, proposed for listing, and candidate species. The analysis, results, and conclusions presented in the BA are based on surveys and research conducted by biologists and botanists contracted by the preparer and the BLM. Based on the analyzed impacts of the subalternative (the Proposed Action with Mitigation) BLM concluded there will be "no effect" on all but five federally-listed endangered, threatened, proposed for listing, and candidate species. For the bald eagle, the BA described that increased activity from implementation of the Proposed Action with Mitigation may increase the incidence of vehicle accidents or disrupted feeding, resulting in a conclusion of "may affect, not likely to adversely affect".

For the four endangered Colorado River fish species, water depletions of up to 19 acre-feet per year for all three sites in total may adversely affect endangered Colorado River fish species. The water depletions constituting the 19 acre-feet per year are to be used during drilling and construction and from boiler makeup water during project operation.

New projects involving a depletion of less than 125 acre-feet per year are required to pay a one-time fee to cover the annual depletion. The estimated depletion for each site is significantly less than 125 acre-feet per year, and depletions are offset in part by augmentation to Yellow Creek during initial dewatering of the process area and reinjection outside of the process area. The project would result in estimated maximum water depletions of 19 acre-feet per year at each test site. Water would be used in drilling, operational, and reclamation phases of the project.

Based on the determination that implementing the subalternative (the Proposed Action with Mitigation) is likely to adversely affect endangered Colorado River fish species, consultation between the BLM and USFWS would occur as agreed under the minor water depletions Programmatic Biological Opinion, which addresses water depletions less than 125 acre-feet per year.

10. Whether the action threatens a violation of federal, state, or local environmental protection law:

The Proposed Action with Mitigation violates no federal, state, or local environmental protection laws.

Potential resource conflicts were resolved through environmental commitments and monitoring stipulations defined in the Proposed Action with Mitigations. These commitments and stipulations were developed during project planning involving all participants in the RD&D program and during ongoing consultations with the Colorado Department of Wildlife, USFWS, and the Rio Blanco County government.

To continue to meet air quality standards the BLM would require the operator to continue to cooperate with existing atmospheric deposition and visibility impact monitoring programs. The need for, and the design of, additional monitoring could include the involvement of the EPA Region 8 Federal Leadership Forum (EPA 2001) and applicable air quality regulatory agencies.

To maintain water quality compliance the BLM will require the operator to install monitoring wells and collect surface water data, to develop a water monitoring and response plan for both surface and groundwater.

A Mitigation Summary Table is provided at the end of the EA. The table summarizes the Proposed Action Design Mitigations and the Subalternative additional mitigations.

Recommended by:

_____ _____

White River Field Office Manager Date

Approved by:

_____ _____

Assistant Secretary, Lands and Minerals Date
Interior Department